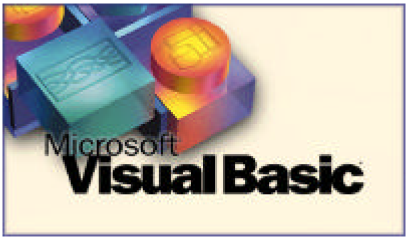
EASYCOM™

The client/server technology for AS/400

Advanced Client EASYCOM/400 for Visual Basic

The Perfect Add-on for



AURA Equipements

MIS Systems

USER Manual

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CHAPTER 1

INTRODUCTION

ACE/400 for Visual Basic

Advanced Client Easycom/400 for **VB** is a complete and powerful AS/400 development tool. It is a high level performance middleware to access interactively all AS/400 resources and services in a native mode, including files, programs, AS400 commands.

The Goal of the product

The complete integration of the EASYCOM engine in the Visual basic development platform. The access to the AS/400 resources is done using the standard Visual Basic components.

ACE/400 for VB was a result of the integration of the EASYCOM technology, that was designed specifically to connect Pc based application to the full enterprise information systems on the AS/400.

ACE/400 for VB is a software interface middleware that makes positioning the AS/400 as both an application server and a data server for all Visual basic client applications a success, further it ensures the portability of the application regardless of the application server.

The Integration

While designing **ACE/400 for VB,** our Research and development team maintained simplicity of use as the tool major target. The integration facilitates using each one of the two platforms (Client side on the PC and server side on the AS/400), to accomplish what it can do best. It ensures maintaining the data on the most efficient platform, avoids duplicating the data, and displays the data in a graphic interface.

ACE/400 for VB is a complete interface of communication between the AS/400 and Visual basic. So, the EASYCOM server functions manages all the communications between the AS/400 and the PCs. While all the functions ACE/400 are perfectly integrated in VB, they do access equivalent functions on the AS/400 Easycom server.

ACE/400 for VB is a complete communication middleware that opens the access to the AS/400 data to the VB developers in native access mode and in real time.

The performance

The client stations under Windows using Visual Basic have with ACE/400 all the advantages inherited from the strength of Visual Basic as a development environment and the native access to the AS/400 data.

Further, ACE/400 opens many other options to the developers:

- Immediate communication to the AS/400.
- No code is generated on the AS/400.
- Data integrity constraints are fully respected.
- Access to transaction commitment control.
- File sharing and record level locking.
- Record level Access at lightning speed.
- Retrieve the description of the AS/400 data files.
- Read the file field description (DDS).
- Read, Modify, Add, and Delete records on AS/400 files from VB.
- Perform optimized read and write operations by using buffers.
- Seek and access files by key,
- Automate showing the links between files.
- Define the filter range for a file access to be a subset of a file.
- Use Data Queues.
- Execute Cl programs on the AS/400 from within VB.
- Call RPG, Cobol, Or C programs on the AS/400 and pass parameters.

The Simplicity of use

Using ACE/400 for VB is largely simplified because of the availability of a standard VB wizard. This simplifies creating prototypes and optimizing the developed programs at a late stage.
This Wizard maintains a list of all AS/400 files used by the application and their relationships, and access path.

CHAPTER 2

System Requirements

System Requirements

AS/400 System Requirements

- Any AS/400 series except the initial B series.
- OS/400 version 2.2 or later
- PC connections through an Ethernet, Token Ring, Twinax or SDLC network, with each PC having a single connection point

PC System Requirements

- 386/25 or better processor
- TCP/IP protocol or one of the following APPC Router:
  PCS , Client Access or NS Router
  Eicon
  Netware for SAA
  Microsoft Client SNA
  Microsoft SNA Server
- Windows 3.x, Windows NT or Windows 95
- 16- or 32-bit Delphi Developer or Client/Server Edition.

Product features

- Functions library (DLL),
- Objects library on the AS/400 (EASYCOM Technology),
- Examples of applications,
- User guide

Client/Server Development, but of course, it's simple.

Once the Easycom engine is installed on the AS/400 side, no other operation is required on the AS/400 side.

The AS/400 components are loaded in a library of objects that manages the protocol of communication **APPC and IP**. It does not require any specific programming tasks to initiate it.

The performance of Pc based applications are comparable to other applications accessing data on Pcs or network servers.

ACE/400 can access files, whether physical, logical, joint, 36 format, as could any application written in RPG or Cobol.

ACE/400 converts all AS/400 field format to equivalent PC format .
ACE/400 has access in real time to the file and field descriptions.

All the security restraints of the AS/400 are complied with, whether on data file access, program access, or on commitment control level. So, all applications can lock records for open files in read/write mode based on the rules for record locking, management and record conflict established by the AS/400 operating system, without affecting other applications accessing the same data files.

The security and data integrity of the AS/400 is not compromised in any way, offering the VB developer a secure and reliable high capacity data server.

The applications developed in VB could issue a variety of AS/400 commands. for example:

- Manage the files accessed using OVRDBF, or OPNQRYF before issuing the file access command in ACE/400 for VB.
- Change the properties of the AS/400 access session.
- Allocate objects.
- Delete, copy, move objects..

CHAPTER 3

Installation Steps

Caution remark :
Some applications that manage AS/400 security can stop the successful installation of the EASYCOM engine on the AS/400, as they cease accepting any data from outside the AS/400 world. In this case, deactivate the security wall prior to the installation procedure.

Installation

The installation procedure for ACE/400 for VB is performed from a PC and it has two different parts:

- The installation of the PC side.
- The installation of the server side on the AS/400.

The AS/400 server side is to be installed once only per AS/400. The following steps will be performed during each side of the installation :

On the PC side:

- Creating an ***'\ACE400'*** directory.
- Adding a sub directory for the examples.
- Copy all required files.

On the AS/400

- Creating an library, default name is ***'EASYCOM'***,
- Creating a variety of files in this library.

Requirement to install

The PC station has to be connected to the AS/400 by either an **APPC router** session ((PCS, Client ACCESS, NETSOFT,...), or by an access **TCP/IP** to the AS/400.

For the installation only, the user profile using the AS/400 connection has to be of type 'QSECOFR' security officer. It is possible to set that profile during the installation steps.
Prior to installing the server side of Ace/400, The user has to know the type of connection to the AS/400.

- Type of connections :

WINAPPC:	Microsoft SNA Server,
EHNAPPC:	Client Access, NetSoft, …
TCP/IP:	Sans routeur

- Access at 16 or 32 bits,
- Default user profile,
- Name of the AS/400 or its IP address.

Installation of ACE/400 for VB

The installation is divided in seperate independent segments; updating the client side on the PC, setup the example programs, setup the demos, and the setup of the server side on the AS/400.

The AS/400 server side is to be installed once only per AS/400. During the installation of the server side, ACE/400 generates a temporary access key for 30 days or 100 connections. When the product is purchased and the registration card is received, a permananent key to the software is generated.

Installation

If Visual Basic is running, close it, the run INSTALL.EXE from the CD.

❶ Fill up the appropriate information and follow the menu options.

❷ If the server side of the ACE/400 install is initiated, fill up the information regarding this site. After validation of the connection, the install will transfer the server side to the AS/400.
In case of a failure to complete this step, the user can transfer the server side by selecting the icon from the newly created user group under Windows;, either « Easycom Server Installation 16 Bits » or « Easycom Server Installation 32 Bits ».

❸ After the installation of the server side, the user can run the 'ACE/400 configuration', to verify the connection.

<u>Notes :</u>

❶ The time of the <u>installation of the server</u> side could vary from 5 to 30 minutes based on the configuration of the AS/400.

❷ If the Job issued on the AS/400 during the installation is in a status SFW (Save File Wait) during a long time, it is normal, just continue to wait.

Installing the samples

Short cuts to the samples are created in the new Ace/400 user group during the installation.

The examples will be in the directory ‘Samples’ under the Ace400 for VB directory.

Because of portability between versions of Visual basic 4 or 5, the major samples are in a VB 4.0 format, but they can be perfectly used in VB 5.0. Some specific samples for Visual Basic 5.0 are also installed.

Refer to the ‘readme.txt’ file in the directory ‘Samples’ for more details.

After a successful installation of ACE/400, you can test the native access to your AS/400 data files in Visual Basic. All the samples included can be modified to further accomplish the tasks at hand.

CHAPTER 4

VB Wizard

With the ACE/400 wizard for VB, a developer can do the following:

- Create a complete form with the associated fields and controls.
- Create a navigation button attached to the file.
- Add/ delete fields from a preexisting project.
- Create a grid to display data from a file.
- Create a Master Detail grid form.
- Manage the files accessed in a project.

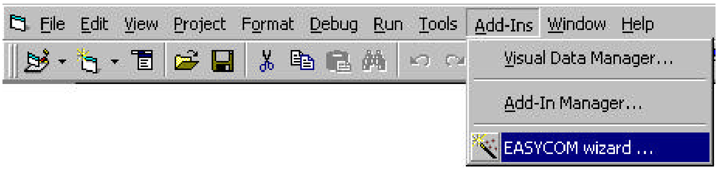
This wizard was designed to work under Visual Basic 5.0. Users of Visual Basic 4.0 can skip to the next chapter.

Using the Wizard

Start the wizard

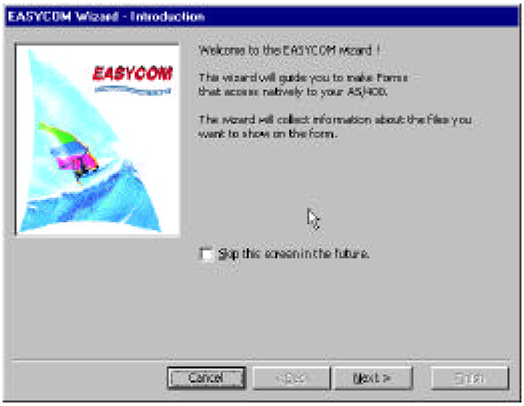
To start using the ACE/400 wizard for VB, it is recommanded to begin with an empty project for the first few trials. But, it is also possible to use the Wizard with a preexisting VB project.

Having installed ACE/400 for VB, the EASYCOM wizard was added to the Add-Ins menu option in Visual Basic under the name EASYCOM Wizard.



After selecting this option, the following screen will be displayed:

Main Selection screen



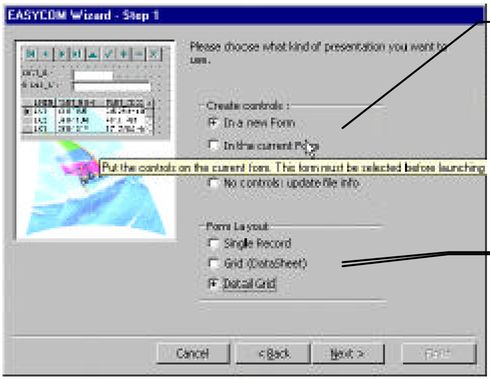
Welcome to the EASYCOM wizard !

This wizard will guide you to make Forms that access natively to your AS/400.

The wizard will collect information about the files you want to show on the form.

☐ Skip this screen in the future.

Push the ‘**Next**’ button to select the appropritae option.


EASYCOM Wizard - Step 1

Please choose what kind of presentation you want to use.

Create controls :
[✓ In a new Form]
In the current Form
Put the controls on the current form. This form must be selected before launching
No controls: update file info

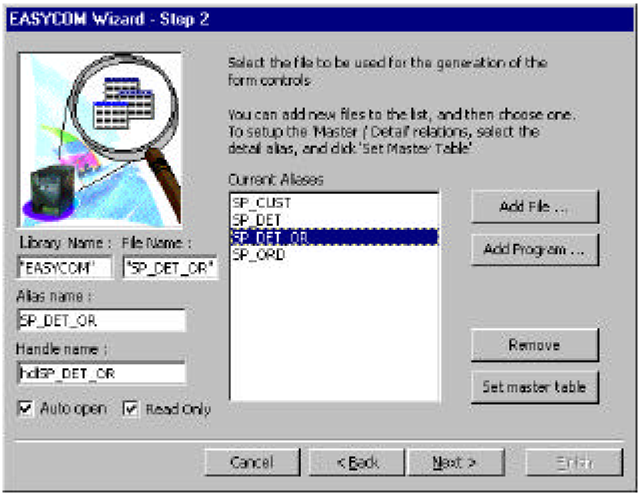
Form Layout
Single Record
Grid (DataSheet)
[✓ Detail Grid]

Create controls:
1. *In a brand new form*
2. *In the current form*
3. *No controls to be created*

Create :
1. *Data access controls for one single file*
2. *Grid access format*
3. *A Detail grid component*

Managing files in a project

In the following screen, the developer selects the files to be used in the project.
When the wizard is started a second time, all previous selections in the project will be displayed and available to be modified.


EASYCOM Wizard - Step 2

Select the file to be used for the generation of the form controls

You can add new files to the list, and then choose one. To setup the Master / Detail relations, select the detail alias, and click 'Set Master Table'

Current Aliases
SP_CUST
SP_DET
SP_DET_OR
SP_ORD

Library Name : "EASYCOM"
File Name : "SP_DET_OR"
Alias name : SP_DET_OR
Handle name : hdlSP_DET_OR
[✓ Auto open] [✓ Read Only]

The first list contains the name of the **ALIAS** used in this project. An Alias is a name used to refer to each file accessed on the AS/400. All the Alias names are distinct names given to each accessed file.

Add an Alias : use the 'Add File' button.
A dialog box will be displayed : Select a name of a library on the AS/400, then select a file from the displayed list of files in the library.

Add a program or a DataQueue : use the button 'Add Program'.
The user will find themselves accessing screens in the RPC/Dataqueue configuration module described in detail in the chapter 'PROGRAMMES and DATAQUEUES'

On the previous screen, the alias name can be modified. Bboth the file name and the library name can be changed.

The name of the files and libraries are defined as literals between quotation marks. If the quotati on marks are deleted, then the label of the file or library is considered a variable. Those variables will have to be defined in a module as a global variable. This functionality is used to use the name of the files and libraries in a generic way.

A **handle** name is automatically created and assigned to each alias. This name is declared as a global variable accessible from anywhere in the project. This handle name can be used directly by the developer in all file access functions.

The wizard does not generate any code using the handle name.

Read_Only : This option is selected to open the file in read mode only. Otherwise, the file is open in « Read/Write » mode.
Warning, the option « Read Only » must not be selected, if you will use the navigation butto ns to edit the file.

AutoOpen : This option indicates that the file is to be opened at the startup of the application.
By unchecking this option, the programmer could initiate the file open command in the code when needed instead of an automated open at the start of the application. (for example, if you like to open the file, only when the file access is needed).

Defining a master/detail relationship

At this stage, it is also possible to define the Master/Detail relationship that govern access to the files.

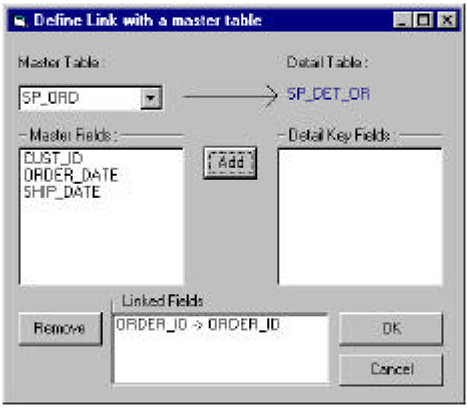
Perform the following steps:

1. Select the alias corresponding to the **detail file.**

2. Push the «set master table» button, a new screen will be displayed.

3. On the new screen, select the combo box « Master Table » to set the name of the alias corresponding to the master file.

4. Select a key field from the 'détail' file and a corresponding field on the le 'master' file, and push the 'Add' button.
   The developer is reminded of the relationship fields and their links by the window labeled 'Linked Fields'.



Master Table : SP_ORD

Detail Table : SP_DET_OR

Master Fields : CUST_ID, ORDER_DATE, SHIP_DATE

Linked Fields : ORDER_ID -> ORDER_ID

5. Push the OK button when the relationships are correctly defined. If you recall this screen by pushing the 'set master table' button again, the relationships defined previously will reappear.

Generating forms

Select the alias corresponding to the data you wish included in a form.

The mode of file accessed depends on the selection made in stage 1.

So, if you selected « single record », you could select any file access type (Master,Detail, Without link)

If you opted for a grid (option « Grid (Datasheet) »), you will have to select a file without link option.

Finally, if you selected the « Detail grid », it is required to select a detail file.

If you are not in one of the three previous cases, the « Next » button will show up grayed. In that case, you will have the options to return back and modify/complete your selection.

The next few screens are used to select fields and the type of control used for each field. You can also add navigation buttons.

Note : To make a form with many files (linked by many Master/Detail relationships or not), it is necessary to start the wizard for each file.

On the last screen entitled **'Finished'**, Click on the **'Finish'** button to Intiate the update of the code, and the creation and modification of the form.

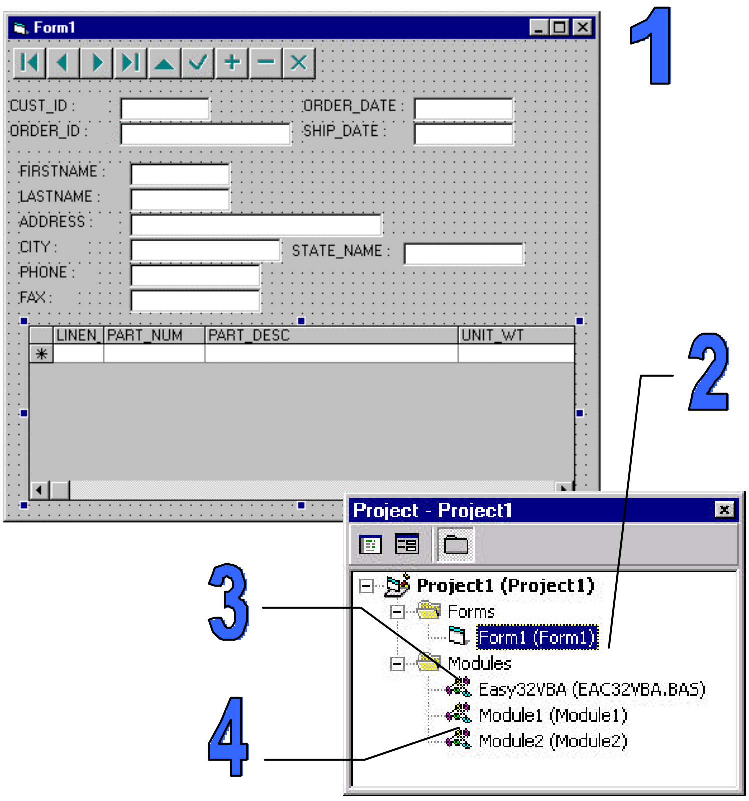
The application is now ready to be executed.

To add files or controls to a form restart the wizard.

Creating a project with EASYCOM Wizard for VB

The structure of a project created or updated with the EASYCOM wizard for VB is simple.

A project generated by the EASYCOM Wizard for VB is devided in 4 parts :



The parts are the following:

1 - One or many forms to access data

2 - The added EASYCOM module EAC32VBA.BAS.

3 - A main module that has the function ‘Sub Main’ and initiates the open file functions implemented in the following module.

4 - A module that contains both the function to manage connectivity, and functions to manage files. This module is called a « Relational Module ». Il contains three functions EASYCOM for VB :

   - Connection to the AS/400.
   - Opening files.
   - Closing Files.

This module is used by the wizard to recall the selection made by the developer. This module **could be a common module used by multiple projects,** and be even **multiple applications.**
This part reflects the list of files used and their relationships selected under the wizard.

To ensure a good operating system, these four distinguished parts must be kept in tha applications, even though the 1st and 3rd parts could be modified to meet application needs. The modification of parts 1 and 3 do not interfer or prevent you from evoking the wizard to **update** the project (Adding controls, forms, or files to access).

The main module

The main module is the one that contains the procedure ‘Sub Main’.

When using the wizard with a new project, this module is named ‘Module1’.

On the other hand, if the wizard is used with a preexisting project that contains a procedure ‘Sub Main’, no other module is created, and the existing ‘Sub Main’ procedure is used.

The following instructions are added to the end of the procedure ‘Sub Main’ :

```
EACVBWizardOpenTables
Form1.Show 1
EACVBWizardCloseTables
```

These instructions proceeds opening all the files, updating their links to each other (see Relationnel Module), and even opening the main form (for example ‘Form1’).

In the case of a preexisting project, it may be necessary to move these calls of procedures inside the ‘Sub Main’ procedure.

The relational layout module

A relational module is associated with every database Client-Server application solution.
The wizard has the task of simplifying the tasks of selecting the files used in a project by **interactively** choosing files and relationships.
These files and relationships are grouped in this module.

This module contains the following information :

The list of files used in the project, and those open at the project startup.

The list of Master/Detail **relationships** between files.

A function named 'EACVBWizardOpenTables' that proceeds both establishing the connection to the AS/400, opening all files and setting up the relationships between files.

A function named 'EACVBWizardCloseTables' that proceeds closing those same files, and disconnecting from the as/400.

The code of this module is completely managed by the wizard. So;

It is not recommanded to modify this module on your own.

Do not add additional functions to this module : they could be lost.

All modifications **in this module only** will be disregarded at the next time the EASYCOM wizard is used with this project.

Each file is defined and determined in the following way::

Alias

Complete name of the file (format Library/File)

Name of the handle used : could be used be other modules.

Name of either a library or a variable containing a library name (external to this module).

Name of either a file or a variable containing a file name (external to this module).

File access mode (Read only or Read/Write mode)

Automated file open at the application statup or not.

All these properties are modifiable by the Wizard.

Each relationship is composed of:

The Alias name of the detail file

The Alias name of the master file

The name of the fields in the master file that are used in the key.

Code attached to the forms generated

The forms generated by the wizard EASYCOM for VB contain standard components.

However, the value of the property ***« Tag »*** is used to distinguish the AS/400 data controls from the standard VB controls. The properties « Data Source » and « Data Field » are not used.

The property Tag has the following format :
*EAC | *ALIAS* | *INFO*

***EAC** is an indicator to recognize ACE/400 modified controls.
ALIAS is an Alias name pointing to an AS/400 file (for a review of the notion of alias, see the function SetAliasName). This value is equivalent to the standard « Data Source » property.
INFO is the part that describes the control directly.

Text and Label Controls

Property '*Tag*' has the following format :*EAC | ALIAS | FIELDNAME

FIELDNAME is a the field name from the AS/400 file

The value of the property '*Caption'* is set to the long heading description associated with a field. So, it is simple to find and recogize each field created by the wizard.

CheckBox Controls

The property 'Tag'has the following format:
*EAC | ALIAS | FIELDNAME | CHECKEDVALUE | UNCKECKEDVALUE

FIELDNAME is the name used to refer to the field.
CHECKEDVALUE is the value of the field when the checkbox is selected.
UNCHECKEDVALUE is the value of the field when the checkbox is unchecked.

Notes :
While executing the application, if the value of a field associated with a checkbox control does not correspond to the CHECKEDVALUE or the UNCHECKEDVALUE, then the control will have a status of undetermined.
The property 'caption' of the control automatically holds the column heading description on the AS/400 for the field.

Radio Button Control

The property 'Tag'has the following format:
*EAC|ALIAS|FIELDNAME|TRUEVALUE

FIELDNAME is the field name
TRUEVALUE the value of the field when the radio button is selected.

The *radio control* buttons are automatically grouped in *frames* to simplify generating multiple groups of radio buttons in the same form.

DBGrid Control

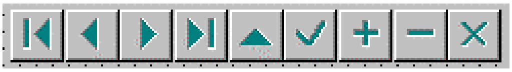
The property 'Tag'has the following format:
*EAC|ALIAS|*AutoRefresh

*AutoRefresh is an optional value for the tag property. It controls the automated refresh of a detail grid. It is usefull in the case of a Master-Detail grids.

The title of each grid column is the value associated with the column of the AS/400 field, and the field name is in the entry '*FieldName*'.
Two events are added to simplify using the component and automatically filling up the grid.

Navigation Buttons

The Easycom wizard can generate navigation buttons automatically:



These navigation buttons are directly linked to a file, and they are used to perform standard file access operations. Including adding , deleting, and modifying records on the AS/400 files.
These buttons are presented in a table format '*CommandButton*'.
The property '*Tag'* of the first button contains the following value:

***EAC|ALIAS**
An event is automatically triggered when the navigation button is clicked to accomplish the file access operation requested.

Functions to automatically manage controls

A project generated by the EASYCOM for VB wizard has many specific functions that use the distinct modifications applied to the created controls (like the Tag Property).
To create those functions, a project generated by the wizard contains a '*Reference*' section (see the Easycom Toolkit menu option under 'Project/References') menu.

This EasyCom Toolkit includes the functions used to automatically manage the access to files:

- Updating a form with data from AS/400 files.
- Updating files with data entered on the form.
- Navigation buttons
- Database Grid

Updating a form with data from AS/400 files

The procedure EACVBBufferToScreen updates automatically the controls with data from the current active record.
Note : For a control to get updated by this function, the property '*tag'* must have been completed as indicated in the section « Contance of the forms generated ».

The controls updated are the control of type 'Label', 'Text', 'CheckBox' and 'RadioButton'.
If an object of type 'DBGrid' has an option '*AutoRefresh' in its Tag property, then an automatic refresh is done for such an object.

Function EACVBBufferToscreen

Parameter	
Pform	Form containing the controls to update

Updating files with data entered on the form

The function EACVBScreenToBuffer updates the current record field buffers with the data contained on the form (but the record is not written to the file).
Note : For a control to get updated by this function, the property '*tag'* must have been completed as indicated in the section « Contance of the forms generated ».

The controls affected are the controls of type 'Label', 'Text', 'CheckBox' and 'RadioButton'.

Function EACVBScreentoBuffer

Paramètre	
Pform	Form containing the controls used by the update operation

Remark : A control associated with a field that could be NULL will be stored on file as the value « ».

Managing the Navigation Buttons

The procedure EACVBNavigator has for goal to simplify the file access, and modifications. The file access operation performed depend on which button was selected.

Function EACVBNavigator

Parameters	
Navig	File Navigation button
Index	Action to perform

Actions to be performed are:

EACVBNAV_FIRST	Read the first record
EACVBNAV_PREV	Read the previous record
EACVBNAV_NEXT	Read the next record
EACVBNAV_LAST	Read the last record
EACVBNAV_EDIT	Select the Edit record mode
EACVBNAV_POST	Post modifications to file
EACVBNAV_INSERT	Select the Add record mode
EACVBNAV_DELETE	Delete a record
EACVBNAV_CANCEL	Cancel the Edit or Add record modes.

- Editing a record : position the record pointer on the targeted record, push the button ▲, modify the fields and push the button ✓.
- Adding a record: Push the button +, enterd the data in the appropriate fields and push the button ✓.
- Deleting a record : Push the button −.

Functions associated with a grid

These functions manage exclusively the operations associated with an objet DBGrid.

<u>Note</u> : For a control to get updated by this function, the property '*tag'* must have been completed as indicated in the section « Contance of the forms generated ».
Further, the property « Data Mode » must be set to « 1– Unbound »

Three functions are used to manage the access to the object DBGrid:
EACVBDBGridUnboundReadData
EACVBDBGridUnboundGetRelativeBookmark
EACVBDBGridUnboundWriteData

The two first functions are used to fill up the grid, they must be called by the following two events; **UnboundReadData** and the **UnboundGetRelativeBookmark** associated with the DBGrid object.
The last function is used when the displayed records on the grid are modified. It must be called by the event **UnboundWriteData** associated with the DBGrid object.

The calls issued to these functions in the events triggered by the object 'DBGrid' are automatically done by the Easycom wizard.

CHAPTER 5

Using Easycom in a VB project

Using a project generated by Easycom wizard

The projects generated by the Wizard have direct access to all the functions Easycom for VB. No additional changes are required.

Opening a new project with EASYCOM for VB

Start Visual Basic 4 or 5.

With VB4 :

- Select the menu option File …New project
- Select the menu option File …Add File
- Select the file EACVB4.BAS

With VB5 :

- Choose the menu option File …New project
- Select Standard EXE
- Choose the menu option Project…Add File
- Select the file EACVBA32.BAS

The functions of the library EASYCOM for VB are accessible just like any other standard library.

Adding EASYCOM for VB to an existing project

Start Visual Basic 4 or 5, and open the existing project.

With VB4 :

- Choose the menu option File…Add File
- Choose the file EACVBA4.BAS

With VB5 :

- Choose the menu option Project…Add File
- Select the file EACVBA32.BAS

The functions of the library EASYCOM for VB are accessible just like any other standard library.

CHAPTER 6

Managing The Connections

Connection

Connection is established by the function **EACVBStartConnection.**

The default parameters associated with the connection are defined in the file EASYCOM.INI.

The target AS/400 is selected by the entry ***location***, the default user Id used to connect is defined by the entry ***uid*** and ***pwd***.
These three entries are in the ***General*** section of EASYCOM.INI file.

However, it is possible to dynamically assign in the program the target AS/400 machine, and the user Id and password by using the commands **EACVBSetMachineName** and **EACVBSetUser**. These functions must be called before the function **EACVBStartConnection**.

Disconnect

In a normal utilization mode, the disconnection is made automatically when the executable application is closed. In a development environment closing the connection is not performed until an explicit call to close the connection is done, or when closing Visual Basic.

In a program, it may be useful to issue a disconnect request, to reconnect under a different user profile, or to a different AS/400 machine. Disconnecting from the AS/400 causes all open files to be closed.

This action is performed by the function **EACVBStopConnection.**

CHAPTER 7

Managing Files

Opening and closing files

Before opening a file, verify that the connection to the AS/400 has been established.

The function EACVBOpenFile is used to open a file by simply providing the name and the library of the object. This function returns a handle used by all subsequent function calls using the open file.

The function EACVBClose closes the AS/400 file.
All the open AS/400 files can be closed in one operation by issuing the command EACVBCloseAllFiles.

Establish a Master/Detail relation

It is frequently required to establish a Master/Detail link between two files with a one to many relationship.

The function EACVBDefineLink is used to Define the links in order to setup the Master-Detail relation between two files.
The function EACVBEnableLink is used to establish the link.

A read to the master file triggers an automatic read to the detail file. This file access could be disabled by issuing a call to the function EACVBDisableAutoRead. On the other hand, reactivating the automated read of the detail file can be accomplished by a call to the function EACVBEnableAutoRead.

File properties

The function EACVBGetFormatInfo is used to get all the attributes of the file, like a record size, number of fields, key definition, etc.

The function EACVBGetRecordCount retrieves the number of records in the file.

CHAPTER 8

Record access functions

Sequential and index file access

Sequential or indexed file access is done by the function EACVBRead. Following the operation requested the read operation is either by key or by sequential read access.

Field access functions

To read the contance of the current record, the developer can use the function EACVBGetFieldValue, and supply either the field name or the sequence number of the field.

The function EACVBPutKeyValue is used to set the value of a keyed field.

The function EACVBPutFieldValue is used to set the value of a field prior to an update.

Field properties

It is possible to retrieve the definition of a field by using the function EACVBGetFieldInfo.

One could get the local size of a field, or the AS/400 size, the field type on the PC or the AS/400, the heading of the field, name (by giving the field sequence number) , etc.

Adding record

Adding a field is performed in two steps.
In a first step, set the data access mode to be « Add» mode by calling the function EACVBAddNew.
Note, the file can not be in ReadOnly mode.
In a second stage, set the values of the fields using the function EACVBPutFieldValue.
The added record is inserted in the file by a call to the function EACVBUpdate.
Cancelling the add record operation is done by a call to a function EACVBCancelEdit

Modifying a record

To modify a record, the data access mode must be set to «Edit» mode by calling the function EACVBEdit.
Note : The file must be open and accessible in write mode.

When this function is called, it locks the cureant record on the AS/400 during this operation.

The function EACVBPutFieldValue is used to set the new values of fields.
Applying the modifications to the file is done by calling the function EACVBUpdate.

The command EACVBCancelEdit is issued to exit the «Edit» mode.

Deleting records

To modify a record, the data access mode must be set to «Edit» mode by calling the function EACVBEdit.
Note : The file must be open and accessible in write mode.

Deleting the current record is performed by issuing a call to the function EACVBDelete.

Filtering and accessing subset of data

The following functions could be used to filter and reduce the number of records available from a file.

The function EACVBPutKeyValue is used to set the filtering to a specific key value to seek.
The function EACVBSetRange is used to set the filtering range interval applied to the file including the min value, the max value, or both simulataneously.

The functions EACVBDisableRange/EACVBEnableRange are used to deactivate a range interval filter, or activate a new filter temporarily.

Example

This example illustrates using the function EACVBSetRange with a min value and a max value simultaneously :

In Visual Basic :

```
Dim ret As EACVBERR
    Dim hdl As Long
    …
    ret = EACVBPutKeyValue(hdl, "KEY", "MinValue")
    ret = EACVBSetRange(hdl, 8, EACVBBOUND_LOWER)
    …
    ret = EACVBPutKeyValue(hdl, "KEY", "MaxValue")
    ret = EACVBSetRange(hdl, 8, EACVBBOUND_UPPER)
    …
    ' Read the record with key greater or equal to "MinValue"
    ret = EACVBRead(hdl, EACVBREAD_FIRST)
    …
```

Using bookmarks

A specific record can be tagged with a bookmark. The bookmark could be used to return and reposition the file pointer to that record immediately at any time.

The function EACVBGetBookmark is used to a define a bookmark on the current record. The function EACVBGotoBookmark is used to reposition the file pointer to a previously defined bookmark.

CHAPTER 9

Managing transactions

Securing data access by using transaction control is completely supported, however, the files to be defined are journaled on the AS/400.

A beginning of a transaction is initiated by a call to the function **EACVBCommit**.

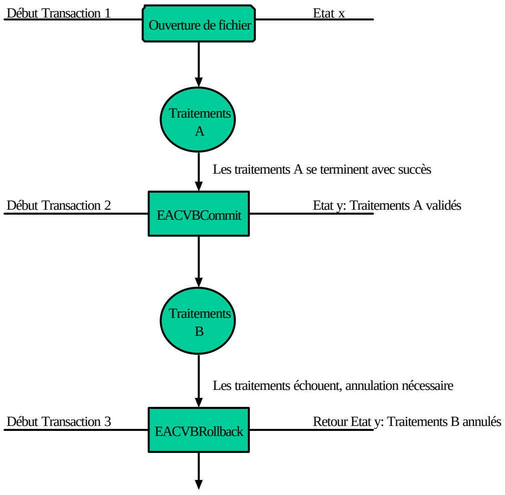
The function EACVBCommit is used to apply the modifications performed since the last **EACVBCommit** or **EACVBRollBack**.

The function **EACVBRollBack** is used to cancel the mofications made since the last **EACVBCommit** or **EACVBRollBack.**

Each call to **EACVBCommit** or **EACVBRollBack** terminates the current transaction and initiate a new transaction.

The transaction control mode is permanent and applies to all journaled files.

Example of steps of transaction control :


Début Transaction 1
Ouverture de fichier
Etat x
Traitements A
Les traitements A se terminent avec succès
Début Transaction 2
EACVBCommit
Etat y: Traitements A validés
Traitements B
Les traitements échouent, annulation nécessaire
Début Transaction 3
EACVBRollback
Retour Etat y: Traitements B annulés

CHAPTER 10

Remote acess commands

The remote access commands are AS/400 comands executed in a NON INTERACTIVE mode (without screen display or keyboard interaction) on the AS/400, with a returned confirmation of execution, and the complete execution of the command.

This action is performed with the function **EACVBRemoteCommand**

Execution of the comamnd is done in three stages:

- Send the command to the AS/400.
- Execute the command on the AS/400 ; The client station is waiting for the process to complete.
- The returned response of the execution (success or not) is returned to the client station.

The notion of executing commands on the AS/400 complements the call to RPC (Remote Procedure Call), that is used to access **programs** on the AS/400. For further details on using **programs on the AS/400** refer to the chapter ‘PROGRAMS and DATAQUEUES’.

CHAPTER 11

Programs and Dataqueues

Preliminary notions :

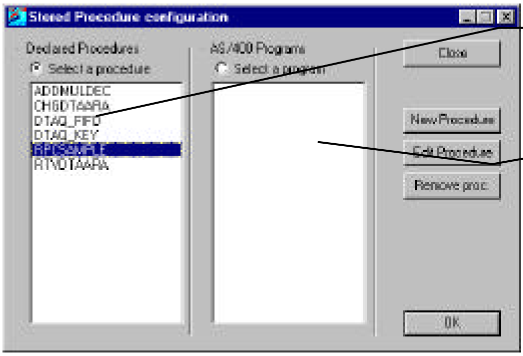
Unlike a file, the AS/400 programs and DataQueues do not have an external description.

A program expects input parameters and returns results by modifying the received parameters. The number of parameters and their data type is only defined inside a program.

A DataQueue contains a file of messages (just like a program, the size and the type of fields in the record in only defined inside the DataQueue).

For EASYCOM to be able to convert data between the AS/400 and the PC, it is necessary to define the structure accessed. The notion of stored procedure is used to allow the client application to access that structure .

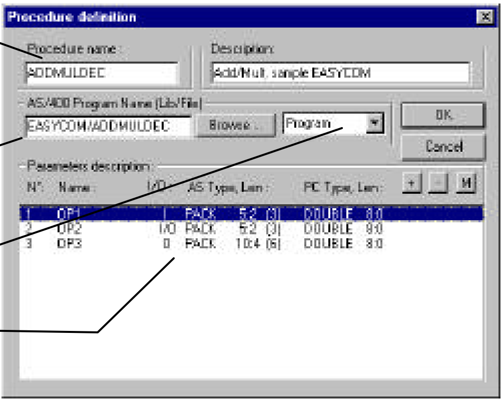
RPC / DTAQ Configuration


Stored Procedure configuration

Declared Procedures
[✓ Select a procedure]
ADDMULDEC
CHGDTAARA
DTAQ_FIFO
DTAQ_KEY
RPCSIMPLE
RTVDTAARA

AS/400 Programs
Select a program

- *List of procedures already created*
- *List of programs, ou DataQueues, that have a procedure attached*

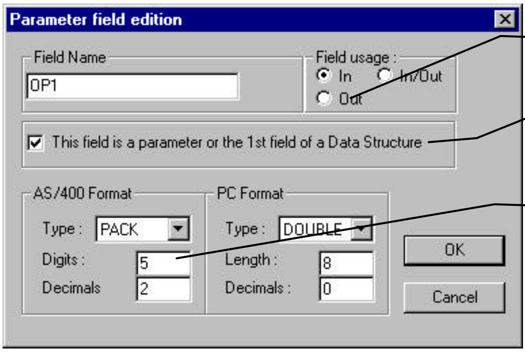

Procedure definition

Procedure name : ADDMULDEC
Description : Add/Mult, sample EASYCOM
AS/400 Program Name (Lib/File) : EASYCOM/ADDMULDEC
Program

Parameters description :

N°	Name :	I/O :	AS Type, Len :	PC Type, Len :
1	OP1	I	PACK 5:2 (3)	DOUBLE 8:0
2	OP2	I/O	PACK 5:2 (3)	DOUBLE 8:0
3	OP3	O	PACK 10:4 (6)	DOUBLE 8:0

- *Procedure identifier*
- *Local program or DataQueue on the AS/400*
- *Type (Program or DataQueue)*
- *List of fields*


Parameter field edition

Field Name: OP1
Field usage : [✓ In] In/Out Out
[✓] This field is a parameter or the 1st field of a Data Structure

AS/400 Format
Type : PACK
Digits : 5
Decimals : 2

PC Format
Type : DOUBLE
Length : 8
Decimals : 0

- *Field usage mode*
- *Type of field*
- *Detail field definition on the AS/400 and on the PC side*

Program description

Procedures can be created to access programs written in RPG, COBOL, CL, C, ...
The only restriction is that the program does not perform any screen I/O or keyboard entry.

➊ Start the « Easycom Stored Proc Configuration » (32 bits router : Easycom Stored Proc Configuration 32 bits) located in the program group « EASYCOM »,

➋ In the dialog box « Stored Procedure configuration », push the « New Procedure » button,

➌ Fill up the dialog box « Procedure definition » :

- **Procedure Name** : as known by the the client station only,
- **Description** : program description,
- **AS/400 Progam Name** : complete AS/400 program name including full path (<Library>/<Program>) .
- **Program/DataQueue** :select program at this option.

➍ Describe one by one the parameters expected by the program. By using the « **+** », « **-** » or « **M** » buttons, to add, delete, and modify parameters.

As a parameter could be a Data Structure, all the elements must be described one by one, and it must be indicated for each field whether it is a single parameter field or a first element of a data structure.

Fill up the dialog box « Parameter field edit » as follows:

- **Field Name** : virtual name given to a field,
- **Field usage** : indicate if the value expected is an input value (IN), or output (OUT), or both (IN/OUT). Generaly the parameters are used as IN/OUT mode.
- **This field is a parameter or the 1st of a Data Structure** : must be unchecked only if this field is not in the first position in the list of fields making up the data structure.
- **AS/400 format** : exact AS/400 field definition of the parameter expected by the program (field type, number of digits, and number of decimals),
- **PC format** : description of the PC format used to view the AS/400 data on the PC.

Many programs could be described with procedures, and even many procedures could be described for the same program. So, the parameter of a program could be a variable data structure, that has a variable format, depending on the values of input variables. in which case, one could create as many description as there is formats available.

The procedures created could be modified by clicking on the button « Edit Procedure », or deleted by clicking on the button « Remove Proc. ».

Using AS/400 programs with VB

Calling procedures on the AS/400 is similar to the read or write operation on a file.

1] RPC With I/O parameters

Executing a procedure is performed in four steps :

- Open the procedure as a file with the command EACVBOpenFile. One open statement is necessary for several consecutive calls.
- Set the input parameters and the I/O parameters with the function EACVBPutKeyValue. The Input and I/O parameters will appear then as keys.
- Executing the procedure by a call to the function EACVBRead. Use the read option EACVBREAD_KEYEQ.
- Retrieve the eventual Output or I/O parameters by issuing calls to the function EACVBGetFieldValue. The Output and I/O parameters are considered and used as fields.

Note that the approach is the same as reading a file by key. The Input and I/O parameters are simply used as key values.

Example

In Visual Basic :

```
Dim ret As EACVBERR
…
‘ open file
ret = EACVBOpenFile("*PGM/RPCSAMPLE",
     EACVBOPEN_READWRITE, hdl)
…
‘ Setup input parameters
ret = EACVBPutKeyValue (hdl, "PARAMIN", InValue, 4)
‘ Initiate a program call
ret = EACVBRead (hdl, EACVBREAD_KEYEQ, 0)
‘ Read of Output parameters
ret = EACVBGetFieldValue (hdl, "PARAMOUT", OutValue)
…
```

2] RPC Without Input parameters.

Without input parameters, we can not access records by key:
The approach to RPC can be done in the following step (five steps) :

- Open the procedure as a file with the command EACVBOpenFile. One open statement is necessary for several concecutive calls.
- Call the function EACVBAddNew to set the access mode to edit.
- Call EACVBUpdate to **Initiate** the execution of a program.
- Call EACVBRead in mode NEXT or FIRST.
- Eventualy issu the call EACVBGetFieldValue to retrieve the returned parameters of the program.

Note : This method of access could be used to receive input parameters that would be set by a call to the function EACVBPutFieldValue prior to issuing an EACVBUpdate request.

Example

In Visual Basic :

```
Dim ret As EACVBERR
…
ret = EACVBOpenFile("*PGM/RPCSAMPLE",
        EACVBOPEN_READWRITE, hdl)
…
‘ Edit mode
ret = EACVBAddNew(hdl)
‘ In stead of the Input parameters
…
‘ execute the procedure
ret = EACVBUpdate(hdl)
‘ retrieve the results
ret = EACVBRead(hdl, EACVBREAD_NEXT, 0)
ret = EACVBGetFieldValue(hdl, "PARAMOUT", OutValue)
…
```

DataQueue Description

All data queue types on the AS/400 can be accessed by procedures. From the simple FIFO dataqueue to the KEYED access dataqueue. The procedure 'DTAQ_FIFO' is an example of access to a simple procedure, and the procedure 'DTAQ_KEY' is an example of access of a keyed procedure.

❶ Start «Easycom Stored Proc Configuration » located in the program group « EASYCOM »,

❷ In the dialog box « Stored Procedure configuration », push the « New Procedure » button,

❸ Fill up the dialog box « Procedure definition » :

- **Procedure Name** : as known by the client station only.
- **Description** : Dataqueue description.
- **AS/400 Progam Name** : Complete AS/400 name including full path of the DataQueue (<Library>/ <Program>) .
- **Program/DataQueue** : Select DataQueue at this option.

❹ Describe one by one the fields of the DataQueue. By using « **+** », « **-** » or « **M** » buttons to add, delete, or modify the parameters.

In the description of the format of the DataQueue, **<u>it is required to eneter</u>** three fields that are not part of the data, but they will be used by VB for field access.

- TIMEOUT : type 'String', size 6 time out to read (time)
- FILER : type 'String', size 2 future use,
- ORDER : type 'String', size 4 Type of operation associated with the key (DataQueue KEYED),

- The fourth field is a key field, if the DataQueue is keyed.

The following fields describ the data fields.

Fill up as follows the dialog bix options: « Parameter field edition » :

- **Field Name** : Virtual name of a field.
- **Field usage** : Unrelated information when it comes to DataQueue.
- **This field is a parameter or the 1st of a Data Structure** : this field is not significant foe a datya queue.
- **AS/400 format** : exact AS/400 field definition of the parameter expected by the program (field type, number of digits, and number of decimals),
- **PC format** : description of the PC format used to view the AS/400 data on the PC.

Many dataqueues could be described with procedures, and even many procedures could be described for the same dataqueue.

The procedures created could be modified by clicking on the button « Edit Procedure », or deleted by clicking on the button « Remove Proc. ».

Using DataQueues with VB

Before using a dataqueue, it must be open, just like a file by issuing the function EACVBOpenFile.
The opened object must be of type *DTAQ/PROC wehere PROC is the name of a procedure selected by the RPC/DATAQUE configuration (see the begining of the chaptre 'PROGRAMS AND DATAQUEUES').

Dataqueue access (without a key) .

Reading records from a dataqueue with ACE/400 for VB is identical to file keyed access without specifying an operation.

The fields 'TIMEOUT', 'FILER' and 'ORDER' are key factors. However, The 'TIMEOUT' parameter is the only one used.

The read operation is done in 3 steps:

- Set the timeout value with the function EACVBPutKeyValue.
- Use EACVBRead to read an entry by key.
- Use EACVBGetFieldValue to retrieve the fields targeted.

The write operation is done in 3 steps too :

- Use EACVBAddNew,
- Use EACVBPutFieldValue to update the value of the fields.
- Use EACVBUpdate to post the data to the dataqueue.

Example

In Visual Basic :

```
Dim ret As EACVBERR
Dim hdl As Long
...
‘ Open a file
ret = EACVBOpenFile("*PGM/DTAQ_FIFO",
     EACVBOPEN_READWRITE, hdl)
...
‘
‘ Write data
ret = EACVBAddNew(hdl)
ret = EACVBPutFieldValue(hdl,"DATA",MyData)
ret = EACVBUpdate(hdl)
…
‘ Read data
‘ One second timeout
ret = EACVBPutKeyValue (hdl, "TIMEOUT",1)
‘ Read dataqueue
ret = EACVBRead (hdl, EACVBREAD_KEYEQ, 0)
‘ Retrieve fierld
ret = EACVBGetFieldValue (hdl, "DATA", OutValue)
…
```

Keyed dataqueue access

The keyed dataqueue access is identical to the access without a key, except for the fact that this time the operation performed must be supplied in addition to the field value.

The operation performed in stored in the field (ORDER in the example procedure) of type string, and its value is the following:

- ‘EQ’ for a read to fetch records equal to a key.
- ‘GT’ for a read to fetch records greater than a key.
- ‘GE’ for a read to fetch records Greater or equal to a key.
- ‘LT’ for a read to fetch records less then a key.
- ‘LE’ for a read to fetch records less or equal to a key.
- ‘NE’ for a read to fetch records not equal to a key.

The read operation is done in 3 steps:

- Set the timeout value, of the acess type (ORDER), and the value of the key for the function EACVBPutKeyValue.
- Use EACVBRead to read record by key.
- Use EACVBGetFieldValue to retrieve the fields targeted.

The write operation is done in 3 steps too :

- Use EACVBAddNew,
- Use EACVBPutFieldValue to update the value of the fields, and the **value of the key field**.
- Use EACVBUpdate to post the data to the dataqueue.

Example

In Visual Basic :

```
' Open File
lret = EACVBOpenFile("*DTAQ/DTAQ_KEY",
        EACVBOPEN_READWRITE, hdlDTAQ_KEY)

lret = EACVBSetAliasName(hdlDTAQ_KEY, "DTAQ_KEY")
mydata = "COUCOU LES COPAINS"
'
' Write data
ret = EACVBAddNew(hdlDTAQ_KEY)
' Set the value of the fields and the key
ret = EACVBPutFieldValue(hdlDTAQ_KEY, "DATA", mydata)
ret = EACVBPutFieldValue(hdlDTAQ_KEY, "KEY", "ABC")
ret = EACVBUpdate(hdlDTAQ_KEY)

' Read a Data element
' Une seconde de ‘timeout’
ret = EACVBPutKeyValue(hdlDTAQ_KEY, "T_OUT", 1)
' Read by key 'ABC'
ret = EACVBPutKeyValue(hdlDTAQ_KEY, "KEY", "ABC")
' Operation key Equal
ret = EACVBPutKeyValue(hdlDTAQ_KEY, "OP", "EQ")
' Read dataqueue
ret = EACVBRead(hdlDTAQ_KEY, EACVBREAD_KEYEQ, 0)
' Retrieve results
ret = EACVBGetFieldValue(hdlDTAQ_KEY, "DATA", OutValue)
```

CHAPITRE 12

Frequently Asked Questions

Verify ACE/400 installation

- In 16 bits, the following DLLs EASYCOM.DLL, EASY16VBA.DLL are in a directory included in the « PATH », or in the subdirectory « \WINDOWS\SYSTEM ».
- In 32 bits, The following files l EASYCO32.DLL, EAC32VBA.DLL are n a directory included in the « PATH », or in the subdirectory « \WINDOWS\SYSTEM ».
- The APPC router either 16 or 32 bits, is correctly installed and configured on the Pc. If you are using an SNA Server, verify both the server side and the client of SNA Server topography.

Acces using 16 bits with either: NetSoft Router, Client Access, Netware for SAA, ...

- The file « EHNAPPC.DLL » of the correct router used must be either in a directory included in the path or in the subdirectory « \WINDOWS\SYSTEM ».
- A default profile has been set, and its parameters are defined to establish a connection top the AS/400.
- The entry « NETWORK= » of the section « [GENERAL] » in the file « EASYCOM.INI » (directory C :\WINDOWS) doe not exist, or it indicates a value of « EHN ».

Access using 32 bits with either: NetSoft Router, Client Access, Netware for SAA, ...

- The file « E32APPC.DLL » of the correct router used must be either in a directory included in the path or in the subdirectory « \WINDOWS\SYSTEM ».
- A default profile has been set, and its parameters are defined to establish a connection top the AS/400.
- The entry « NETWORK= » of the section « [GENERAL] » in the file « EASYCOM.INI » (directory C :\WINDOWS) doe not exist, or it indicates a value of « EHN ».

Access in 16 or 32 bits router using SNA Server.

- The files « WINAPPC.DLL » (16 bits), or « W32APPC.DLL » (32 bits), of the correct router used must be either in a directory included in the path or in the subdirectory « \WINDOWS\SYSTEM ».
- The entry « NETWORK= » of the section « [GENERAL] » in the file « EASYCOM.INI » (directory C :\WINDOWS) indicates a value of « SNA ».
- The entry « LU= » of the section « [SNA] » in the file « EASYCOM.INI », must indicate the alias of a Local L.U.
- The entry « LOCATION= » of the section « [GENERAL] » in the file « EASYCOM.INI », must indicate the alias of the Remote L.U. AS400.

TCP/IP natif access.

- TCP/IP is running on both the PC side and the AS/400.
- The entry « network + » in the section « [GENERAL] » of the file « EASYCOM.INI » (directory 'c:\WINDOWS') indicates the value «tcp».
- The entry « location » of the section « [GENERAL] » in the file « EASYCOM.INI » (directory 'c:\WINDOWS') indicates the IP address of the AS/400.

Verify the middleware installation

- The AS/400 operating system number is correct.
- The information in the dialog box « Server Installation » (server name, LU name) are correct,
- The router access mode either 16 or 32 bits, is correct,

The user profile used by the router to connect to the AS/400 has the appropriate rights to read/write records to the AS/440 library.

CHAPITRE 13

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Technical Support Advanced Client Easycom/400

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